

Animas River Mine Water Spill

Briefing Report



For the Radioactive and Hazardous Materials Committee
September 25, 2015



Presentation Outline

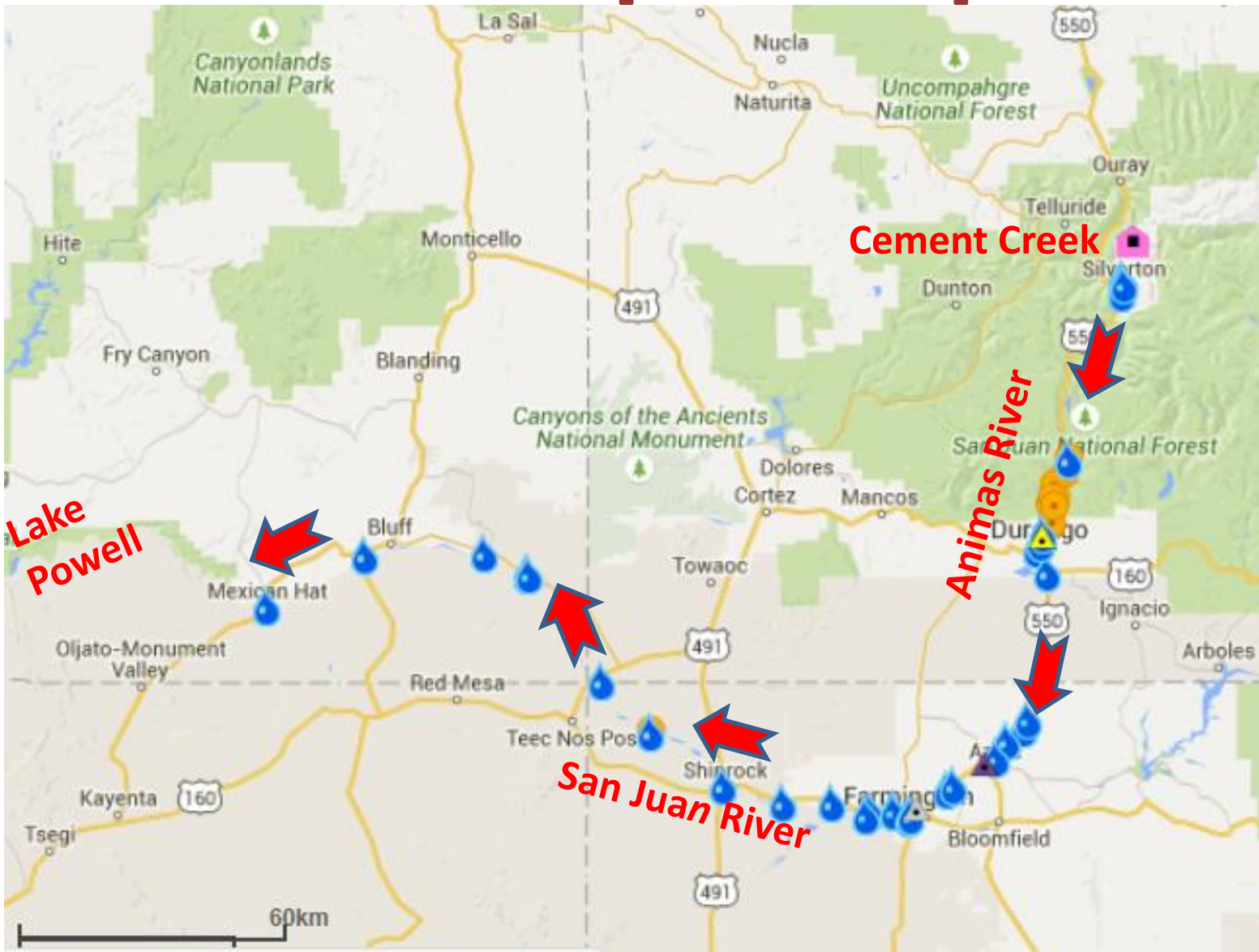
- **Gold King Mine blowout**
- **New Mexico's spill response actions**
- **Long-Term Monitoring Plan**
- **Cleaning up mining and milling sites in N.M.**

August 5, 2015 Blowout

- The Gold King Mine near Silverton, CO was operated from the late 1800's into the 1930s.
- Abandoned mine workings have long been a source of acid rock drainage (ARD).
- Bulkheads installed to plug up ARD caused the impoundment of mine water in the abandoned workings, and a 1,000 foot rise in the water table.
- EPA work crew digging into a collapsed mine tunnel triggered the blowout of impounded water.



Spill Map



Executive Directives



Governor Martinez has:

- **Declared an emergency and authorized up to \$750,000 in expenditures;**
- **Ordered NMED to lead the spill investigation; and**
- **Created a Long Term Impact Team consisting of NMED, NMDOH, NMOSE, NMDA, and NMDGF**

New Mexico's Response

The following New Mexico organizations are working together to protect public health, water quality and the environment.



New Mexico Department of Agriculture



THE UNIVERSITY of
NEW MEXICO

NM
STATE

All About Discovery!
New Mexico State University

Initial Timeline

Aug. 5, 2015 – Spill triggered by EPA work crew

Aug. 6, 2015

- NMED was notified of the spill by the Southern Ute Indian Tribe
- NMED advised public water systems to stop taking water from the river, and provided notice of the spill to public sewer systems, the Navajo Nation, Arizona and Utah
- NMED and OSE advised ditch users to close river diversions
- NMED mobilized field teams and sampling equipment

Aug. 7, 2015

- Secretary Flynn, State Engineer Blaine, and NMED technical staff arrived on site
- NMED began monitoring and water sampling
- NMED issued additional precautions for domestic wells and livestock watering
- NMDGF advised anglers not to eat fish caught in watershed
- Secretary Flynn authorized up to \$500,000 in emergency expenditures
- NMED created a dedicated webpage for spill info and data

Aug. 8, 2015

- **Contamination plume entered New Mexico**

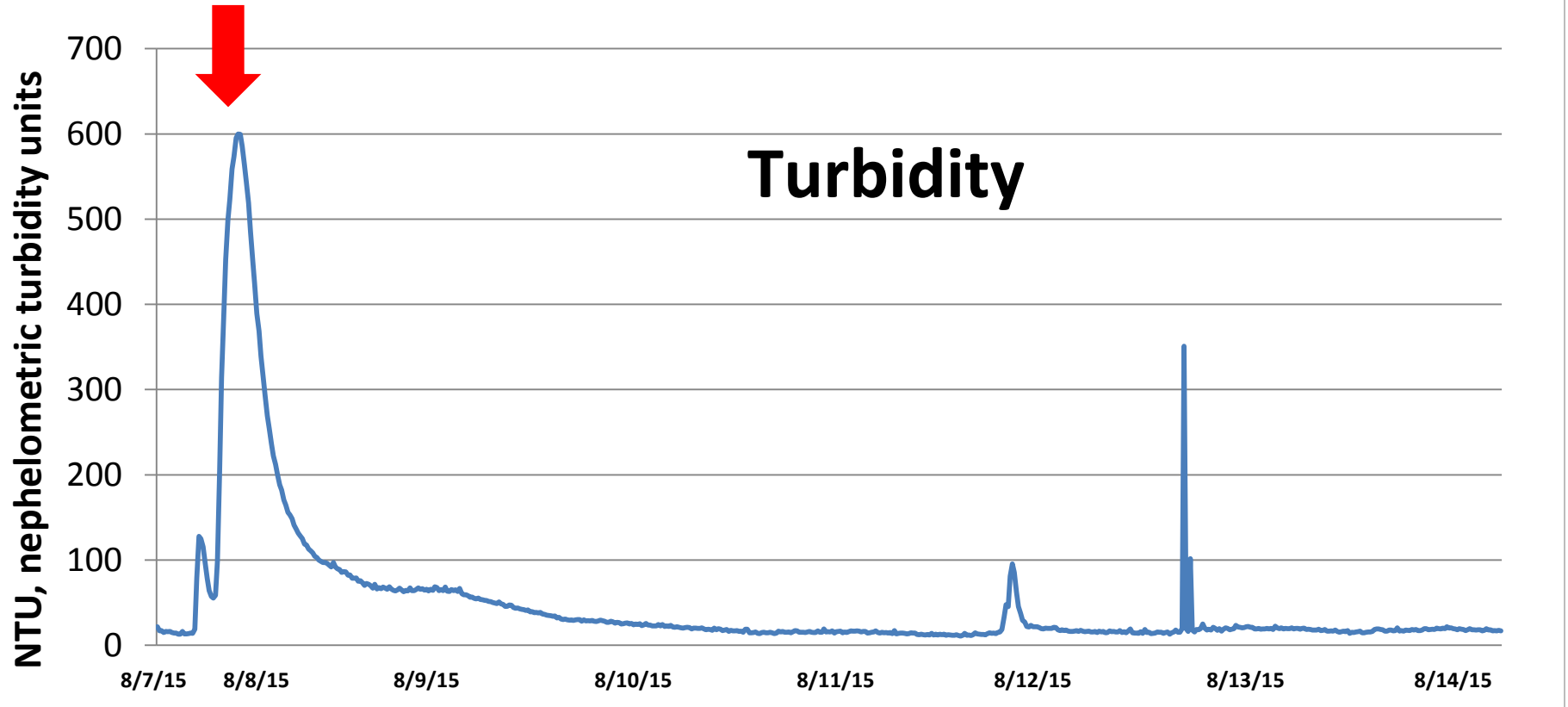
Aug. 10, 2015

- NMED had 25+ staff on site
- Governor Martinez declared an emergency and authorized up to \$750,000 in expenditures

Animas River near Aztec, NM

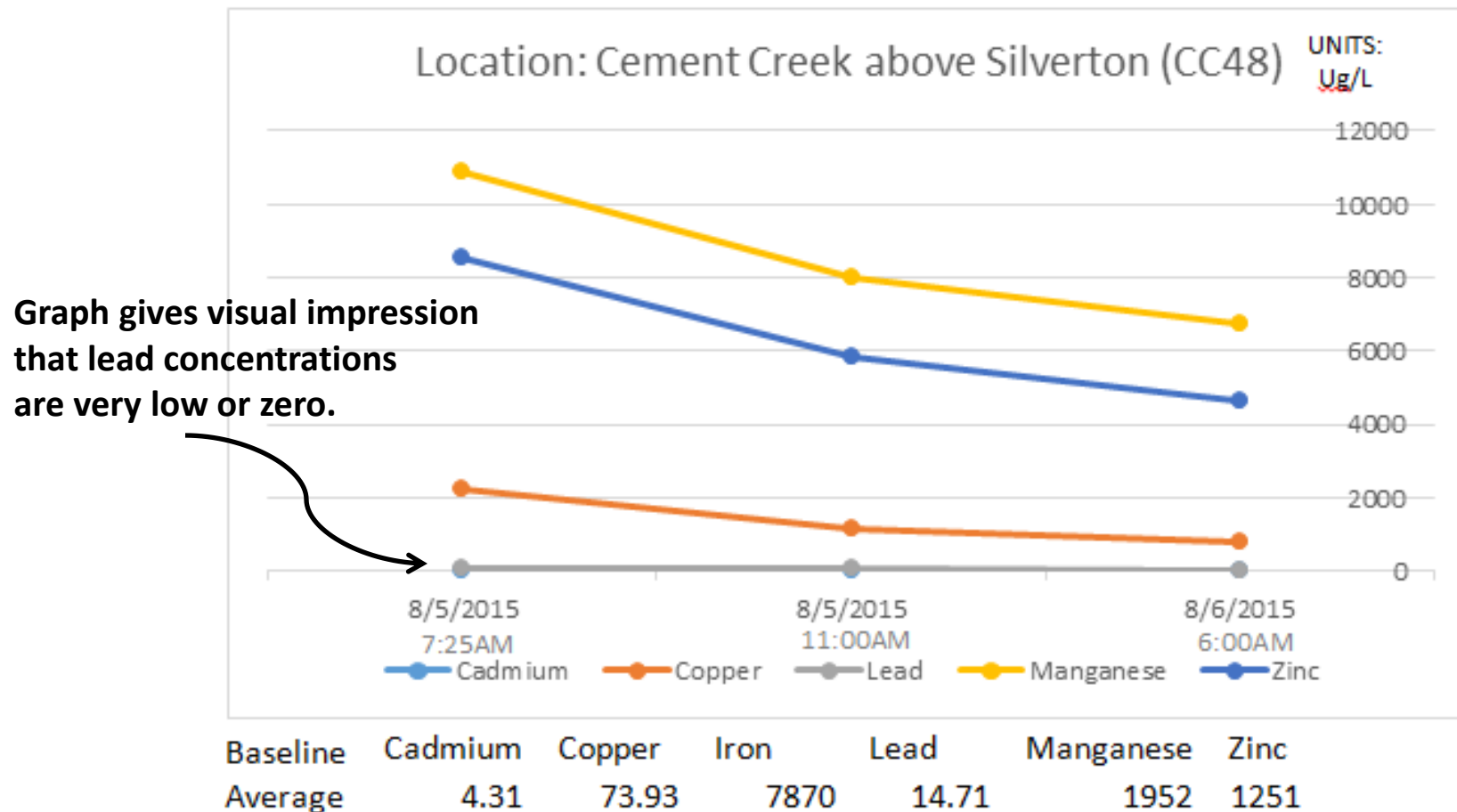
(above Estes Arroyo, NMED data)

Plume Arrives in NM



EPA Graph of Dissolved Metals in Surface Water

(Provided by EPA to NMED on August 7, 2015)



Total Metals in Surface Water

Plume Arrives in NM



µg/L	Drinking Water Standard	8/5/15 Cement Creek	8/5/15 Animas in CO	8/7/15 Animas in N.M.	8/8/15 Animas in N.M.
Arsenic	10	8,230	1,080	ND	21
Cadmium	5	165	28	ND	ND
Lead	15	179,000	25,600	3	350

Total (unfiltered) metals in micrograms per liter (µg/L)

Public Drinking Water Protection¹

- **NMED was in daily contact with system operators to share information and provide consultation and assistance**
- **Intakes from the Animas River were closed prior to arrival of the plume**
- **NMED and water systems conducted extensive testing of public drinking water**
- **Water storage was calculated and water sharing efforts were initiated**
- **No customers received contaminated drinking water or lost water service**

¹ NMED has been granted primacy by EPA to administer the Drinking Water Program (NM Drinking Water Regulations, 20.7.10 NMAC). The Code of Federal Regulations Part 141 National Primary Drinking Water Regulations and Part 143 National Secondary Drinking Water Regulations are adopted by reference.

Private Domestic Well Protection

- **NMED tested samples from ~580 private domestic wells during a Water Fair from Aug. 10-15, 2015; NMED provided test results to well owners**
- **NMED and U.S. EPA sampled 144 private domestic wells located within 500 feet of the Animas River for laboratory analysis; EPA provided test results to well owners**
- **No evidence that any private domestic wells have been impacted by the plume**



Irrigation Water Protection

- **Some, but not all, irrigation ditch intakes could be closed prior to arrival of the plume**
- **All ditches were flushed with river water for 12 hours, without irrigation diversions, to wash spill sediment back into Animas River**
- **Drinking water system intakes on the Animas River were not opened until after the irrigation ditches had been flushed**

Fish, Livestock and Wildlife Protection

- **No evidence of fish kills; caged fish survived immersion in colored river water.**
- **No evidence of unusual livestock or wildlife mortality.**

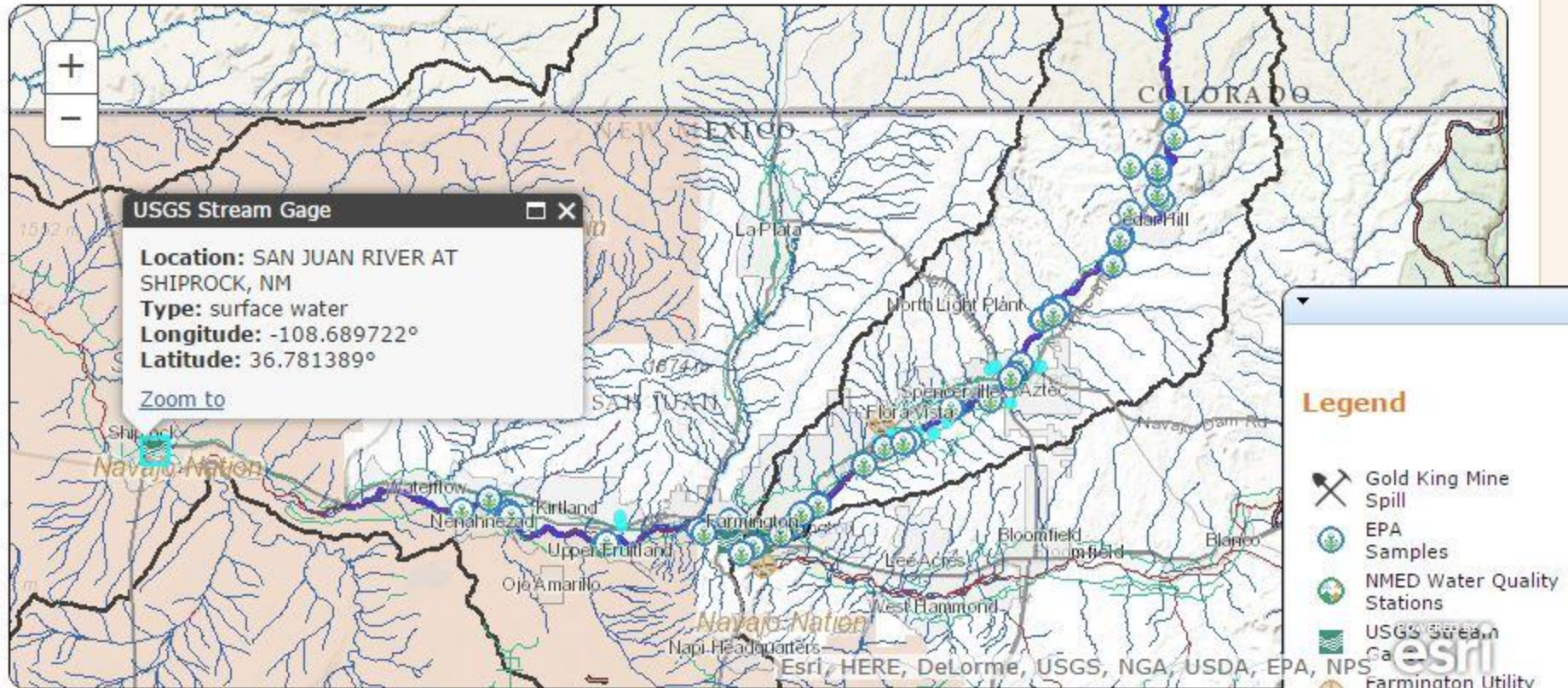
Response Summary

- **NMED was onsite, and began testing water, before the plume arrived in New Mexico**
- **Public drinking water supplies were protected and monitored**
- **No evidence of spill impacts to private domestic wells**
- **Irrigation ditches have been flushed**
- **No evidence of unusual fish, livestock or wildlife mortality**

NMED's Interactive Spill Map

<https://www.env.nm.gov/riverwatersafety/>

Map of the Spill



Long Term Monitoring Plan



**Spill sediment deposited underwater in the
Animas River in N.M.**

Long Term Monitoring Plan

- **Public Drinking Water Systems**
- **Surface Water Quality**
- **River and Irrigation Ditch Sediment**
- **Soil in Irrigated Croplands**
- **Hyporheic Zone (where ground and surface water mix)**
- **River-Aquifer Hydraulics**
- **Airborne Dust**
- **Bio-Monitoring**
 - **Benthic, aquatic and riparian organisms**
 - **Fish tissue**
 - **Wildlife**
 - **Livestock**
 - **Crops**
 - **Humans**

Long Term Monitoring Plan

Risk Assessment

Assess present and potential future risks to:

- **Public health**
- **Drinking water sources**
- **Water-based recreation**
- **Livestock**
- **Irrigated agriculture**
- **Fish and other wildlife**

Long Term Monitoring Plan

Background Issues

To the extent possible, differentiate between the effects from:

- Natural geologic acid rock drainage
- Historical acid mine drainage
- Historical mine waste spills into the Animas watershed prior to August 5, 2015
- August 5, 2015 blowout

Acid Rock Drainage (ARD)

- **Some metal mining areas contain sulfide minerals like pyrite (fool's gold).**
- **Sulfide minerals can oxidize and release sulfuric acid and metals into water.**
- **Undisturbed ore bodies can generate ARD, and mine workings create more potential for ARD.**
- **ARD can pollute ground and surface water and kill fish.**
- **Some ARD sites in New Mexico have been abated.**

How Did Cement Creek Get It's Name?

Iron and other metals in ARD can precipitate and cement near-surface sediments into ferricrete. Geologic deposits of ferricrete in Cement Creek demonstrate that ARD has been occurring in this mineralized area long before mining began in the late 19th century.



Ferricrete

Bog Iron



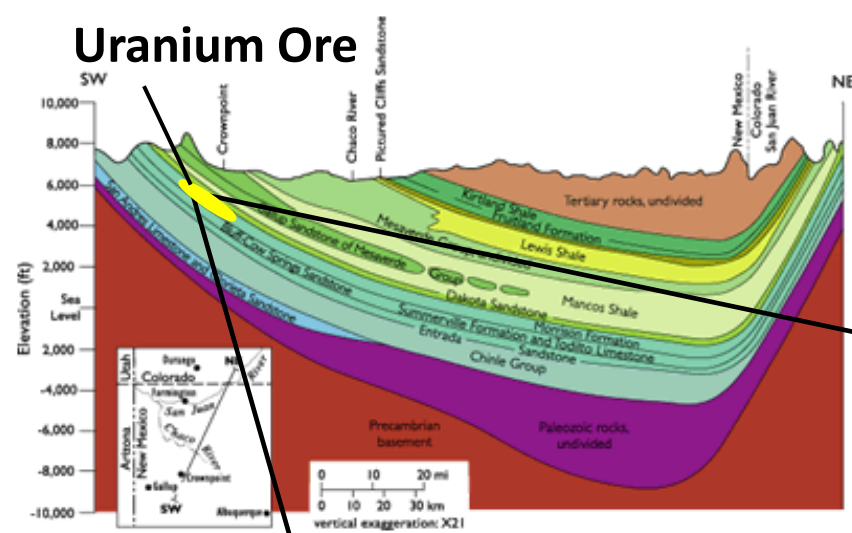
Mining, Milling and Smelting

- Miles of mine tunnels in the Silverton area provide even greater opportunity for oxidation of sulfide minerals and release of sulfuric acid and metals. ARD has been seeping out of mine workings and into Cement Creek for more than a century.
- A number of mills and smelters in the Silverton area also discharged waste into the Animas watershed.
- Significant flood/spill events occurred on October 5, 1911, in June 1975 (tailings pond breach and fish kill in the Animas River), and on June 6, 1978 (Lake Emma drained through mine workings and carried contaminants into Cement Creek and the Animas River).

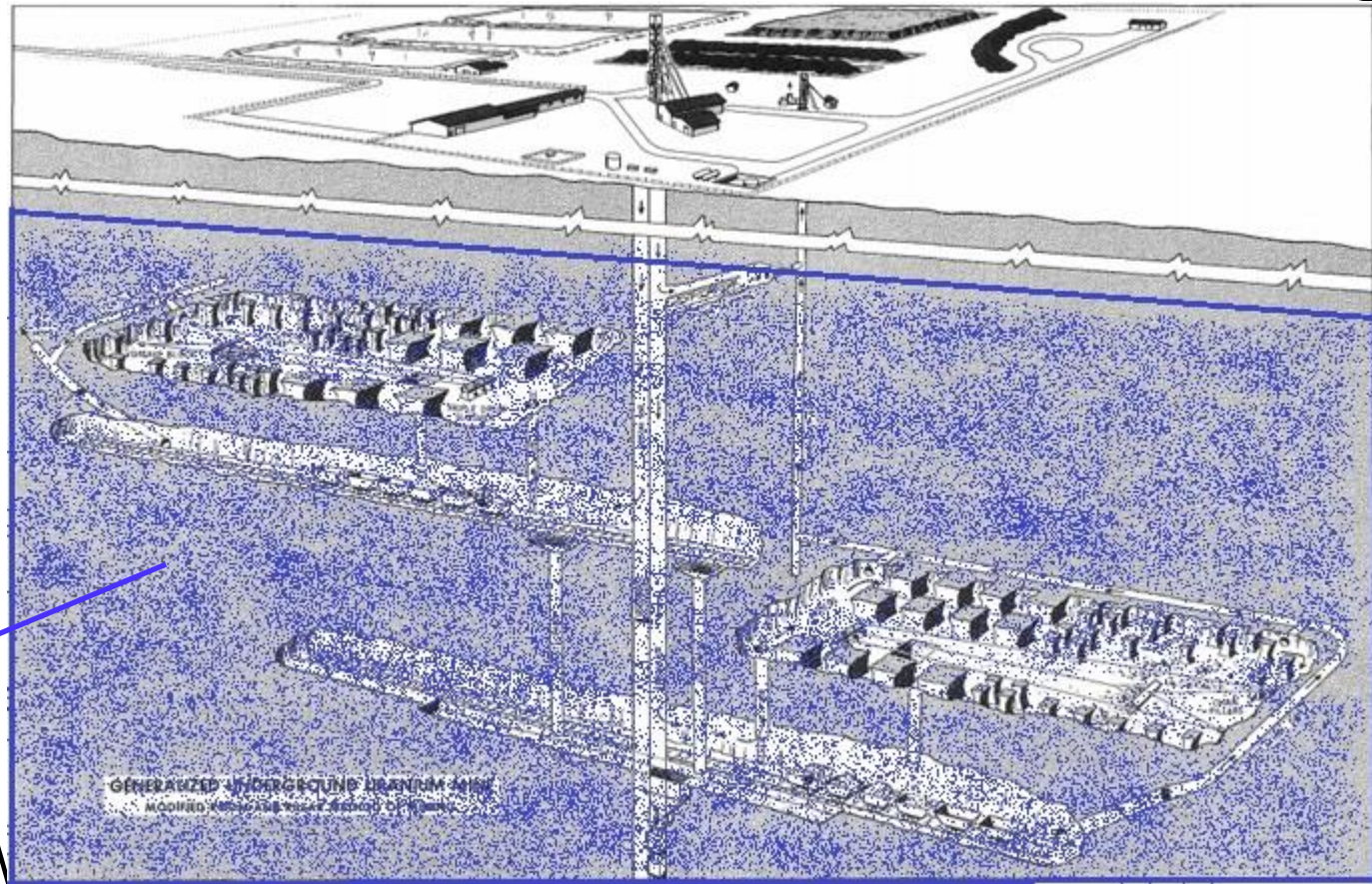
Mine Waste in New Mexico

- **Energy Minerals and Natural Resources Department estimates more than 15,000 abandoned mine features in the state.**
- **NM Mining Act and NM Water Quality Act, federal Superfund, federal Uranium Mill Tailings Radiation Control Act, and federal Surface Mining Control and Reclamation Act provide cleanup and reclamation authority. EMNRD and NMED work in coordination to clean up mining sites.**
- **Some abandoned mines in NM are flooded with groundwater, but we do not have a potential blowout situation analogous to the Gold King Mine.**

Uranium Ore



Grants-Gallup Uranium Mines



Mines now flooded
with groundwater, but
water level is below
ground surface

Cleaning Up NM Mine Waste, Examples

Site	Waste Issue(s)	Corrective Actions	Authority
Terrero Mine El Molino Mill	Acid rock drainage, fish kills	Mine waste isolated and stabilized; Willow Creek reconstructed; wetlands built	State AOC
Homestake Uranium Mill	Groundwater contamination; radon in air	Tailings cover and stabilization; ground water pump and treat	Superfund
Carrizozo Gold Mill	Cyanide in groundwater	Pump and treat	Superfund
Chino and Tyrone Copper Mines	Waste ponds and tailings	Grading, capping, re-vegetation	NM Water Quality Act & Mining Act
Swastika Coal Mine	Coal gob pile	Grading, capping, re-vegetation, restore stream channel	Surface Mining Control and Reclamation Act
Cunningham Hill Gold Mine	Cyanide and cobalt in GW	Mine water treatment	NM Water Quality Act & Mining Act
Socorro Smelter	Lead in soil in residential area	Extensive soil removal	Emergency Superfund

Terrero Mine Before Cleanup

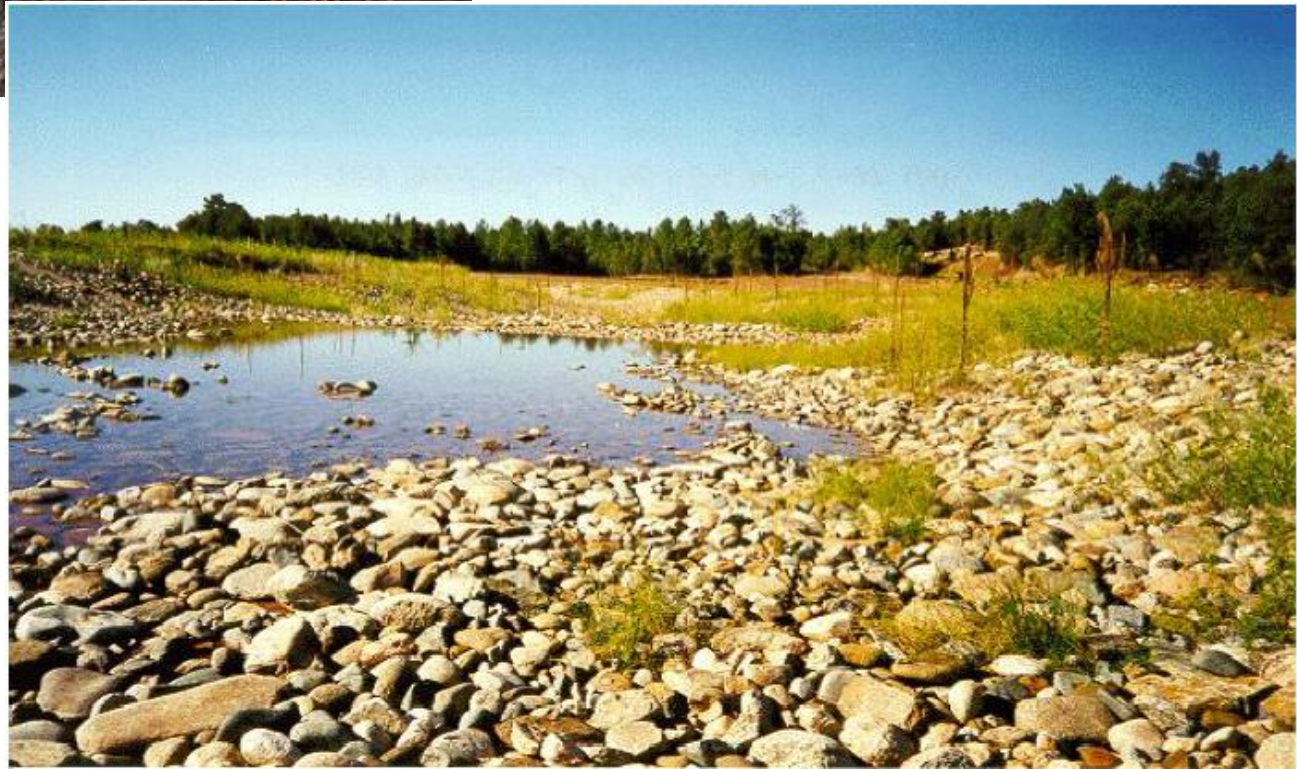
- Acid rock drainage into Willow Creek
- Periodic fish kills in the Pecos River



Terrero Mine After Cleanup



El Molino Mill Tailings Before and After Cleanup



Tyrone #3 Copper Tailings Before, During and After Restoration



Swastika Mine Coal Gob Pile Before and After Restoration



1976

Chino Copper Mine Lake One Before and After Reclamation

2015



Pinos Altos Mine Tailings After Cleanup



Questions?

8:11 SEP/11/2013